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HAARP conspiracy: Analysis of its role in the 2023 Turkey & Syria earthquakes on Twitter

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ENG **Abstract.** Twitter, currently known as X, is a platform where disinformation is often disseminated, particularly through conspiracy theories. This study examines a conspiracy theory linking the HAARP radio communications program to the 2023 earthquakes in Turkey and Syria. From February 4 to February 20, 2023, we monitored the keyword 'HAARP' on Twitter across 11 languages and analyzed over 500,000 tweets using network theory, statistical analysis, emotion and polarity quantification, natural language processing, and the Disarm methodology. Our findings reveal a consistent pattern across all languages, with emotional factors significantly influencing dissemination. We conclude that the disinformation campaign operates on a global scale, employing a deliberate strategy that takes into account local nuances. Our study suggests that the Disarm methodology is well-suited for analyzing such campaigns.
Keywords: Haarp, earthquake, disinformation, conspiracy theories, Twitter.

ES Conspiración HAARP: análisis de su papel en los terremotos de Turquía y Siria de 2023 en Twitter

Resumen. Twitter (actualmente "X") es un terreno fértil para la difusión de desinformación, con especial atención a las teorías conspirativas, sobre todo las relacionadas con el programa de radiocomunicaciones HAARP. Este estudio examina una teoría conspirativa que vincula este proyecto con los terremotos de 2023 en Turquía y Siria. Rastreando la palabra clave "HAARP" en Twitter del 4 al 20 de febrero de 2023 en 11 idiomas, analizamos más de 500.000 tuits utilizando teoría de redes, análisis estadístico, cuantificación de emociones y polaridad, procesamiento de lenguaje natural y metodología Disarm. Los resultados muestran un patrón consistente en todos los idiomas, donde los aspectos emocionales contribuyen significativamente a la difusión. El estudio concluye que la campaña de desinformación opera globalmente con una estrategia definida, incorporando matices locales. La metodología Disarm se considera adecuada para analizar este tipo de campañas.
Palabras clave: Haarp, terremoto, desinformación, teorías de las conspiración, Twitter.

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1. Introduction

Communication in the digital ecosystem has gained increasing importance in shaping public opinion (Campos Domínguez and Calvo, 2017). The Internet and social networks are becoming platforms for conversations and debates that previously took place in the media (Goyanes *et al.*, 2021). Consequently, political and social actors leverage these platforms to disseminate their messages (López-García, 2016), aware that any user can easily and immediately (Casero-Ripollés *et al.*, 2016) access them in a context where exposure to informational content is steadily increasing, and users receive multiple messages every day.

This landscape gives rise to phenomena such as filter bubbles (Pariser, 2011), wherein users reinforce their opinions, emotions and personal beliefs, even though they believe they are being rigorously informed and accessing diverse content. There are also the so-called 'echo chambers or content resonance chambers (Colleoni *et al.*, 2014). In this case, opinion groups exchange information and believe

they are disseminating useful and interesting content, but in reality, they do so within a limited context, comprising those who share their ideas (Agur and Gan, 2021).

Furthermore, much of this shared content has not been fact-checked (Van der Linden *et al.*, 2017). Consequently, the transmission of false information is facilitated, either due to the unintentional dissemination of erroneous messages or through the intentional propagation of false messages, which aim, among other things, to polarise public opinion (Søe, 2018). This is the essence of disinformation, a concept the European Commission (2019) defines as "information that is verifiably false or misleading, created, presented, and disseminated for economic gain or intentional deception of the public". It has become a critical problem for contemporary democratic societies.

One of the social media platforms particularly conducive to the development of these phenomena is Twitter, now known as X. This is attributed, on the one hand, to its unique characteristics that place it halfway between a media outlet and a blog (Stieglitz and Dang-Xuan, 2013) and, on the other, to its concise messaging style (Díaz-Campo *et al.*, 2021), which amplifies certain ideas while censoring others (Guess *et al.*, 2018). To achieve this, if necessary, fictitious accounts are created (Tandoc *et al.*, 2018) and sophisticated dissemination strategies are employed (Zhao *et al.*, 2020).

Another pivotal concept in describing this landscape is that of opinion leaders, commonly referred to on social media as influencers. These individuals distinguish themselves by their remarkable ability to connect with various groups and social sectors and, most importantly, persuade them (Baviera, 2018). Consequently, opinion leader profiles are characterised by a substantial following and active engagement on social networks. Simultaneously, they play a crucial role in spreading false content (Arce-García *et al.*, 2022).

At the institutional level, various initiatives are under way to combat disinformation, with the DISARM (DISinformation Analysis & Risk Management) [https://disarmframework.herokuapp.com/about] framework taking a lead position. Initially known as AMITT (Adversarial Misinformation and Influence Tactics and Techniques), this open-source master framework aims to counter disinformation through the coordination of effective actions and has been adopted by institutions such as the European Union and NATO.

This framework is structured around a foundation and identifies several phases in any incident or event related to disinformation, including planning, preparing, executing and assessing. Additionally, a series of possible TTPs (Tactics, Techniques, and Procedures) have been identified within each phase.

1.1. Conspiracy theories and online communication

While there are multiple characterisations of conspiracy theories (Mahl *et al.*, 2022), they can be defined as explanations that reject official accounts of historical or ongoing events. These explanations assert that several individuals or groups with hidden agendas are responsible for or behind such events (Uscinski, 2018). Furthermore, these covert actors aim to effect societal change. In the past, conspiracy theories, which have been prominent in fields like politics (Mede and Schäfer, 2020) or the media (Waisbord, 2018), were generally perceived as inconsequential phenomena with limited impact (Sunstein and Vermeule, 2009; Mahl *et al.*, 2022).

However, transformations in the media landscape, particularly with the advent of social media, have reshaped this scenario. These platforms possess attributes that facilitate swifter dissemination of such false narratives while the communities and groups that coalesce around them expand and gain greater visibility (DeWitt *et al.*, 2018; Uscinski, 2018). This phenomenon has been demonstrated in contexts such as climate change (Mahl *et al.*, 2021) and the Covid-19 pandemic (Allington *et al.*, 2021; Zeng and Schäfer, 2021).

In general, the literature addressing these questions underscores a strong correlation between the use of social networks and the dissemination of conspiracy theories (e.g., Stempel *et al.*, 2007; Jamieson and Albarracín, 2020; Enders, 2021). Similarly, personal beliefs and principles stand out as influential factors predisposing people to interpret certain events through the lens of conspiracy theories (Cassese *et al.*, 2020; Miller, 2020).

Regarding this clandestine dimension, conspiracy theories intersect with the concept of false content mentioned earlier, as they can encompass both misinformation (unintentionally false information) and disinformation (strategically false information). Additionally, Twitter and Facebook have been the most scrutinised social networks in the context of conspiracy theories (Mahl *et al.*, 2021).

Conversely, other studies have identified the substantial role played by bots in spreading conspiracy theories through social media, particularly during natural disasters or catastrophic events (Erokhin and Komendantova, 2023). Specifically, these authors highlight that, while there exists a greater number of accounts belonging to individuals compared to bots accounts involved in interactions, bot accounts exhibit significantly higher activity levels. The use of highly emotional discourse not only attracts attention, but also creates a polarisation in society that is shifted towards negative vectors, making it more powerful and more likely to be re-disseminated (Segado-Boj *et al.*, 2020).

1.2. The earthquakes in Turkey and Syria, the HAARP project and conspiracy theories

On February 6, 2023, two major earthquakes struck Turkey and Syria. The first earthquake, occurring at 4:17 a.m. local time, registered a magnitude of 7.8 Mw and had its epicentre in the Turkish province of Gaziantep, near the Syrian border. Approximately 9 hours later, a second earthquake occurred with an epicentre in the province of Kahramanmaraş and a magnitude of 7.5 Mw. Subsequently, more than 1,000 aftershocks followed. One month later, it was reported that 55,000 people had lost their lives, with over 47,000 in Turkey and more than 7,000 in Syria.

After a recent natural disaster, a prominent conspiracy theory circulated on social media,

attributing the earthquakes to the HAARP program—High-Frequency Active Auroral Research Program. Financed by the U.S. Air Force and Navy, HAARP aims to study ionospheric properties for radio communication technology and strategic surveillance systems, including missile detection. The program features 180 antennas covering about 14 hectares in Alaska, forming a potent high-frequency transmitter. Conspiracy theorists have linked HAARP to various events, accusing it of causing earthquakes in Iran in 1990 and Haiti in 2010 (Radford, 2014; Gkinopoulos and Mari, 2023).

Therefore, the primary objective of this research was to analyse the impact of HAARP-related conspiracy theories on the social network platform Twitter (currently called X) during the earthquakes in Turkey and Syria.

As such, the following hypotheses were formulated:

1. H1. The activity and direction of the discourse is centred on a relatively small number of accounts that also operate in an organised manner.
2. H2. Emotions also play a major role in the process and contribute to the increased spread of conspiracy theories.

2. Methods

This study aimed to investigate a conspiracy theory in the form of a disinformation campaign on the social network Twitter (currently known as X) concerning the events surrounding two earthquakes in Turkey and Syria in February 2023. The campaign is based on a claim that a research system in Gakona, Alaska (USA) called HAARP, which transmits high-frequency radio signals, caused the catastrophe. It falls within the latest conspiracy theories circulating on social networks. To understand this campaign, we tracked the occurrence of the keyword "Haarp" on Twitter worldwide between 5 and 20 February 2023. Twitter was chosen as a source because it is the main social network for news and opinion distribution channels (González-Fernández, 2016) and short messages (Gligorić *et al.*, 2019) during the research period, which allowed free access to accredited researchers until mid-2022.

For this purpose, we used R software and the AcademicTwitteR library (Barrie and Chung-ting, 2021), which interfaces with Twitter's API 2.0 through an academic account. A total of 507,130 messages were collected in various languages, with Turkish (Tr - 231,525) being the most prevalent, followed by English (En - 109,842), Spanish (Sp - 45. 401), Japanese (Jp - 22,466), French (Fr - 21,154), Dutch (Nl - 13,989), Portuguese (Pt - 13,442), Arabic (Ar - 7,739), Indonesian (In - 7,195), German (Gr - 7,011) and Italian (It - 5,670). Languages with fewer than 1,000 messages were not included in the analysis.

Subsequently, all these data underwent various analytical techniques:

1. Graph theory analysis (Barabasi, 2016) was performed to examine connections between different users through retweets. For this purpose, we transferred the data from R to Gephi software version 10.1, using the ForceAtlas2 distribution algorithm (Jacomy *et al.*, 2014) and identifying clusters (Chen *et al.*, 2020) using the Louvain algorithm (Blondel *et al.*, 2008). Additionally, we determined values to assess the nature and behaviour of messages in each language, including modularity, average edge length, average degree, network diameter and number of edges that comprise it.
2. Statistical analysis was carried out using R software to explore various aspects, including linear regression, establishment of similarity dendrograms, message emission density over time, eigenvector analysis, and Pearson's correlation between emission densities across different languages. The comparisons were in terms with regard to the nature of the network, participating accounts and message content.
3. Emotions and polarity were analysed and quantified using the National Research Council of Canada (NRC) lexicon for each studied language (Mohammad and Turney, 2010, 2013) through the Syuzhet Library in R (Jockers, 2017). This involved attributing basic emotions (anger, disgust, anticipation, fear, joy, sadness, surprise and trust) (Plutchik, 2010) to each word, along with its positive or negative polarity. Each word was assigned a value or intensity based on the surrounding words (Swati *et al.*, 2015), resulting in a global message value.
4. Natural language processing (NLP) techniques were used to examine the relationship between words contributing meaning and that are most common in messages in each language. These word groups were clustered through k-means algorithms using t-tests. The analysed texts included the messages sent and the self-descriptions in the user profiles.
5. Character length of messages was determined for each language.

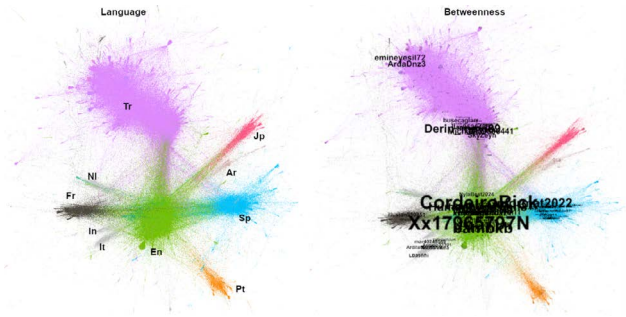
Typical patterns and codes in organised disinformation campaigns were identified using the codes and tools provided by the Disarm Foundation (Disarm, 2022). These detection and countermeasure tools have been adopted by NATO's Stratcom (Newman, 2022) and the European Union's External Action Group (European Union-External Action, 2023). Through these techniques, the aim was to compare the behaviour of the network, themes, nature and behaviour across different languages to determine whether there are statistically significant similarities.

3. Results

The data collection yielded a total of 507,130 messages in the period between February 5 and February 20, 2023.

The network map, based on language distribution (Figure 1), indicates that while Turkish (Tr) accounts for the highest number of messages, the central focus of the graph corresponds to messages in English. This observation aligns with the fact that the account with the highest eigenvector value is associated with @stewpeters, an American known for promoting conspiracy theories and disinformation, with an online program that supports the anti-vaccine movement and the QAnon movement (Cramer, 2022; Butler, 2023).

Figure 1. Network map based on languages (left) and intermediation (right).



Source: Own elaboration.

The subsequent accounts with the highest eigenvector values are affiliated with gaming influencers. Nevertheless, some accounts (such as @ArdaDnz3: 0.725 eigenvector, @Siyahisolkanat: 0.682, @RosesMariaa: 0.449, @hakanmecu: 0.421) have relatively few followers and are of recent creation but are highly relevant within the disinformation campaign. They discuss various topics, from soccer to animals, among which they tweet on Turkish politics and conspiracy theories (@_BirolALKAN: 0.661 or @tolgaozcelkk90: 0.331). Several critical accounts in the network ceased to exist four months later, such as @ronin19217435 (eigenvector 0.434). Completing the top eleven accounts in the network are @daisy061512 (0.389) and @wolsned (0.379), both disseminating conspiracy theories in the United States and the United Kingdom respectively. In the Turkish-speaking segment, only a few groups are detected denouncing the spread of disinformation and its falsehood, primarily composed of scientists and science influencers.

Figure 1, on the left, illustrates the examination of intermediation, where larger font sizes represent higher values. Remarkably, accounts with elevated intermediation values are predominantly within the English-speaking group and languages linked to English. Notably, intermediary accounts in Turkish, Spanish, French, or Italian act as bridges across different language groups. Two prominent Turkish accounts exhibit significant betweenness centrality values but lack connections to other languages. Each language's network structures reveal well-organized patterns with relatively high modularity values. However, the average degree remains low across languages, suggesting that interactions are primarily directed towards a limited number of accounts.

These accounts are closely interconnected (Table 1), resulting in a short average edge length, except for English, Spanish and Turkish, where more extensive debate occurs. This leads to a larger network diameter in these three languages. Consequently, users can reach any message in their language with very few connections, suggesting that they are part of highly cohesive networks with significant interrelations among them.

Table 1. Data from each network group.

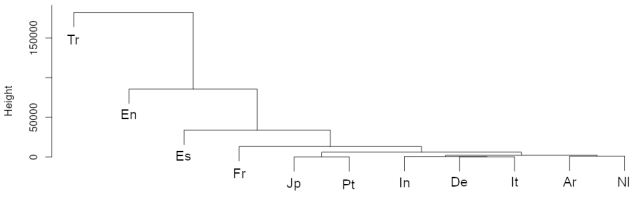
	Ar	De	En	Es	Fr	In	It	Jp	Nl	Pt	Tr
Average degree	0.024	0.018	0.407	0.172	0.078	0.02	0.019	0.045	0.028	0.046	0.847
Network diameter	5	4	17	21	7	5	8	10	8	5	16
Average edge length	1.764	1.252	6.391	7.302	2.444	1.181	2.948	2.930	1.554	1.313	6.558
Modularity	0.697	0.72	0.599	0.546	0.556	0.725	0.572	0.657	0.82	0.549	0.697
Number of edges	4780	3716	81778	34464	15669	4116	3844	9140	5609	9186	170091

Source: Own elaboration.

The similarity between language clusters is shown in Figure 2, where it can be observed that the behaviour within the different language networks is strikingly similar, with a statistically similar nature and behaviour. Consequently, nearly identical user network behaviours are identified between Japanese and Portuguese and among Indonesian, German, Italian, Arabic and Dutch. Only the Spanish and English groups show less homogeneity and similarity in their networks, although their similarity remains high. Thus, the network is highly similar across different languages, with Turkish being the most distant.

Analyzing the temporal distribution, a correlation was observed between the rate of message emission in each language. There was a notable similarity of behavior between messages in English and Indonesian (R=0.757), Spanish (0.855), German (0.829), Dutch (0.875), and French (0.713), and to a lesser extent, with Arabic (0.487). Likewise, there are significant correlations between messages in Portuguese and Italian (0.748), Indonesian and German (0.893), Indonesian and Spanish (0.893), French and Arabic (0.744), and, to a lesser extent, in Japanese and Spanish (0.546). Turkish is the only language that does not have any statistical correspondence in the time of emission with any other language. The time correspondence of broadcasting between languages of countries, even very distant ones, is quite high in some cases.

Figure 2. Dendrogram of cluster similarity by language.



Source: Own elaboration.

The examination of the profiles and comments of the users participating in each language (Tabla 2) reveals a striking similarity among them. The examination of the most frequently used words in the profiles and comments allows us to identify specific patterns:

Table 2. Most used words with associated meaning by cluster.

Language	Most used words in profiles by cluster	Most used words in messages by cluster
English	• First, America • some time • patriot, Christian, conservative, Trump, MAGA • God, love, freedom, truth, family, country, father, Jesus, world • new, account, Twitter • married, please • live, know, everything • now • great, mother • always, well • never, go back, continue	• call, Turkey, Romania, punishment, use • base, Romanian, senator, technology, thousands, Diana • Turks, attacks, information, America, light, modification • microwave, penetrate, potentially, Earth, frequency, weapon • USA, support, Nazis • create, listen, say, speak • clouds, struck • research, aurora, active, program • expansion, massive, year, NATO, people, power, provoke, earthquakes, time, used, HAARP, Turkey, conspiracy, not to say, control, Syria, sky, Turkey, chemtrails, world, agenda, climate, video
Spanish	• dark-skinned, infowarz, feminaziz, falsapandemia, urkozfeminaziz • light • agenda, live, right, left • I believe, family, homeland, justice, country, Chavist, patriot, Venezuela, anti, lover, truth, free, freedom, life, love, heart • animals, nature • time • Venezuelan, nobody, father, peace, things, engineer, mother, people • anti-communist, music • politics • social	• awakening, continue, spread, explain, truth, clear, works • USA, fair, all, attacked, ballots, minister, Turkish • will, eruptions, volcanic technology, exists, provoke, coincidentally • modify, control, landslide, movement. • Turks, Twitter. • united • sky, lights, USA, world, today, weapon, climate, earthquake, HAARP, Turkey, NATO, project, Syria, Turkey, war, trend, years • attack, false, flag, makes, week, ago • meteorological, billion, waves
French	• God, live • love, life, blockade, Twitter, everything, Frexit, time, politics, patriot, free, France, world, truth • have, Macron • health • dictatorship • right, other countries, children, conspiracy, history, human, French, good, nature • fair • justice	• Romanians, day, bomb, parliament, Diana, senate • system, American, provokes, mayor, accuses • video, plot, era, car, invite • Turkey, lawsuit, often • rays, strange • climate, control • well, can • Turkish, project, seismic, technology, research • HAARP, Earth, tremors, Turkey • do, weapon
Italian	• God, good, bad • year, freedom • heart • lights, liberate, verse, state • day, time, animals, patriot, NATO, blockade, music, politics, world, freedom, life • big, homeland • justice	• seismologist, Dutch, violent, direct, unleashed • attack, Diana, Romanian, senator • news, Haiti, Chavez, unity • irradiating, interested, area • year, hour, person • paths, chemicals • parliament, Russia • Americans, climate, technology, earthquake, speaks • time, February, program • USA, weapon, NATO, first, Syria, system, HAARP, earthquake, Turkey, project

Language	Most used words in profiles by cluster	Most used words in messages by cluster
Dutch	• Crypto, free, freedom • never, stop • people, God, world, love, truth, life • patriot, alone • Trump, MAGA • anti, Twitter, law	• equipped, USA, anchors, system, HAARP, news, strong • done, out, turnips, possibly, used • everything • comes, people, world • geoengineering, chemtrails, everyone • says, parliament, Syria, NATO, truly, HAARP, Turkey, cause, trend, see, evil oak, knows, truth • nature
German	• people, live, truth, freedom • unvaccinated, always • world • human • account, satire • patriot • right	• project, HAARP, program, military, year, ZDF • George Orwell, evil, HAARP system, February • believe, much • always, more, freedom, weapon, world • drawn, why • people, chemtrails, USA, Turkey, earthquakes, HAARP, Syria • NATO, attack • straight, Turkey
Indonesian	• live, for, die • love, news, willpower, God, Indonesia, account • coup, try, truth • life, account, for you • Islam, try, truth • world, anti, Muslim	• war, world, America, begin • HAARP, disaster, world, fair, opposition, intelligent • technology, power, doctor, ampere • theory, conspiracy, consequences • study, program, research, auroras, frequency • researcher, anchored • frequency • investigator, anchored
Turkish	• the one who says, happy, Turkish • Atatürk • approval, isn't • university, Istanbul • account, Allah, Fenerbahçe, tracking, Galatasaray, interior, Turkish	• HAARP, why? it can be, technology • two, get divorced, great • plot, theory, important • even, ancient • natural, Turkey, Istanbul, fault, at all, war, ship, earthquake, HAARP, how, happened, again, American, weapon • market, last, minutes • help, belong • entry, apartments, neighbourhoods, below • still, Allah, get it, please, help, debris, news, Turkey, earthquake
Portuguese	• everything, Brazil, God, freedom, family, homeland, Christian, mother, conservative, patriot, Bolsonaro, direct, Brazilian, married • born • love • president, lord, Christ, truth, love, Jesus, against, world, politics, Brazilian, married, arms race, Bolsonarist, better, country • anti, left • catholic • favour	• article, production, war, rain, read • serious, agency, Russia, intelligence, broadcast, note, accusing, United States • Romanian, senator, Diana, serious, parliament, complaint, speech, HAARP, turkey, use, earthquake • people, cause, breed, geophysics, tsunami, capable, cyclones • Earth, cause, microwave, penetrate, weapon, earthquakes, can, frequency, similar • natural disasters • theory, conspiracy • antennas, world, years, all, we can, be objects, climate, global • control, Snowden, day, magazine • climate, influence, potentially, powerful, technology
Japanese	• love, world • climate, weapons, control, mental, disease, accidents • violent, • antenna, killer • disease, meteorological, HAARP, • cause, things, bad • Turkey, Syria, earth • villain No. 1, US military	• weapon, seismic, meteorological HAARP • HAARP, broadcast, please • live, kanonji, prefecture, kagawa • affects, fingers, hands, feet • unbearable, stress, devil • accident, catastrophic, control, mind • administrator, criminal • fatal, accident, human • control, mind • cause, everything, bad

Language	Most used words in profiles by cluster	Most used words in messages by cluster
Arabic	• Allah, in, my, • Life • Hallelujah	• dangerous, why? • states, earthquake, flee • system, destructive, earthquake, west • project, HAARP, tremors • earthquake, climate • Turkey, climate, tremors, world. • control, Earth.

Note: MAGA: Make America Great Again, Trump's slogan in the 2016 US elections.
Source: Own elaboration.

The examination of the profile users reveals several commonalities: they present themselves as religious, conservative, patriotic individuals who invoke freedom and life. Except for the Turkish users, who participated in more debates and displayed various shades of opinion, the user profiles in the remaining countries are remarkably consistent.

Considering the emojis used by the 278,866 users to identify themselves in their profiles, flags are the preferred choice: 6,709 users display the Turkish flag (🇹🇷), 2,990 the United States flag(🇺🇸), 1.563 the Brazilian flag (🇧🇷), 764 the Russian flag (🇷🇺), 564 the Canadian flag (🇨🇦), 527 527 the French flag (🇫🇷), 485 the British flag (🇬🇧), 443 the Ukrainian flag (🇺🇦), 442 the Spanish flag (🇪🇸), 440 the Italian flag (🇮🇹), 412 the German flag (🇩🇪), 352 the Venezuelan flag (🇻🇪) and 349 the Palestinian flag (🇵🇸). Other symbols observed as well: 877 use a Christian cross (✝️), 873 a syringe (💉), 844 a green heart (💚), 710 various types of 'Z' (a Russian symbol for the invasion of Ukraine, 🇿, Ⓩ, 🆉 , 💤), 573 with rainbows (LGTBi symbols) 🌈, 🏳️‍🌈), 383 red pills (related to the red pill culture of awakening to the progressive or woke culture, 🔴, 💊), 338 with a clenched fist (✊), 70 with a hammer and sickle (☭). These symbols corroborate our observations from the words used in profiles, indicating connections between patriotic and highly polarised elements. It is worth noting that several of the most frequently detected flags and symbols correspond to countries, languages or geopolitical situations unrelated to the earthquakes themselves.

Regarding sent tweets, a common trend is found in nearly all languages, linking the Alaska-based HAARP project — which studies ionospheric properties for radio communications — to earthquakes and tremors, such as those that occurred in Turkey and Syria, as well as tsunamis and cyclones. Various conspiratorial aspects also appear in multiple languages, such as chemtrails.

References to Romania are derived from statements made by Romanian senator Diana Iovanovici Șoșoacă, an anti-vaccine and far-right ideologue, regarding conspiracy theories surrounding the earthquake in Turkey. In 2021, The Russian state-owned news outlet Sputnik named her "Politician of the Year 2021 in Romania". That same year, she and her husband were accused of attempting to kidnap journalists from the Italian RAI 1 channel, which led to an intervention by the Italian Ministry of Foreign Affairs (Birzai, 2021; Digi24, 2021).

By analysing the average emotions associated with messages in each language, the most intense emotions were found to be fear (0.86 in Portuguese to 0.67 in Spanish, except 0.04 in German), anger (0.73 in Italian to 0.41 in Spanish, except 0.03 in German) and disgust (0.29 in Turkish to 0.10 in French), followed to a lesser extent by sadness, surprise and trust. Consequently, fear, anger and disgust emerge as the three predominant negative emotions in the discourse, with disgust being particularly associated with the dissemination of conspiracy theories rather than a humanitarian catastrophe. However, this similarity in emotions across languages is confirmed by emotional behaviours that align with Pearson between Spanish and Portuguese (R=0.965), English (R=0.943) or Italian (R=0.920), as well as between English and Portuguese (R=0.940) or Italian (R=0.995) or French (R=0.954), and, to a lesser degree, Turkish (R=0.981 with French). German remains more distant from the other analysed languages in this emotional examination (R between 0.556 with Portuguese to 0.897 with French). Not all languages were included in this study due to a lack of a comparative lexicon available for analysis using an algorithm.

Following the NATO Stratcom report on content generation in disinformation campaigns using artificial intelligence (Fredheim 2023), the use of these systems exhibits several shared characteristics, such as types of words employed, common expressions and even similar message lengths. It is evident that the median, except for Dutch (74.25), is consistent across all languages, standing at 140 characters exactly. Similarly, the means range around this value, while the first and third quartiles also hover around 140 characters (except Dutch with 26 at first and 125 at third quartile, and 181 at third quartile in Japanese). The uniformity in message length across nearly all languages strongly suggests the prevalent use of artificial intelligence in crafting these messages.

3.1. Nature and behaviour of user accounts

The diverse accounts participating in each language exhibit creation values, as shown in table 4, with creation dates in both median and mean values displaying remarkable similarity. Six countries have a median around mid-2020, whereas the Indonesian and Arabic accounts were set up in late 2019, with a few days' difference. Notably, only the accounts tweeting in Spanish and Italian are older (2017 and 2018 respectively). Furthermore, their engagement metrics, including retweets, number of followers, and those they follow closely resemble one another, with characteristic values for nano-influencer accounts —typically a few hundred followers, falling short of a thousand on average. This profile aligns with the characteristics observed in other academic studies

involving astroturfing campaigns (Arce-García *et al.*, 2023).

These are modest-profile accounts, relatively recently created yet exhibiting high activity. They send a substantial volume of messages, averaging between 8 and 13 tweets daily (with exceptions such as Turkish accounts at 2.82 and Japanese accounts at 27.64). Throughout their existence, these accounts consistently send tens of messages daily, indicating a high activity level. Only among Turkish accounts, as previously observed when reviewing user profiles and messages, is a more typical user behaviour and nature noticeable. In contrast, Japanese accounts have a more unusual profile, with exceptionally high daily message activity (median of 27.64 messages and an average of 84.35 respectively). The behaviour and nature of the accounts align closely with those in other languages.

Table 4. Behaviour and nature of user accounts.

	Median					Mean				
	created	Tweets sent	Tweets/ day	Followers	Following	Created	Tweets sent	Tweets/ day	Followers	Following
Ar	15/09/2019	10.548	8.40	382	675	31/01/2018	41.096	22.24	10.145	1.471
De	23/09/2020	9.219	10.45	331	502	06/11/2018	30.591	19.50	1.154	1.225
En	26/03/2020	9.080	8.54	309	622	27/03/2018	33.899	18.91	1.713	1.621
Es	01/01/2017	19.340	8.62	450	758	21/09/2016	55.375	23.61	2.895	1.850
Fr	24/07/2020	12.813	13.59	246	429	29/08/2018	81.674	49.86	2.644	1.134
In	01/09/2019	6.484	5.11	230	370	21/12/2017	32.227	17.06	28.209	1.002
It	18/10/2018	18.290	11.52	515.5	581	20/09/2017	67.833	32.24	1.572.8	1.447
Nl	08/04/2020	9.166	8.73	337	582	09/03/2018	34.359	18.97	1.527	1.393
Jp	17/02/2021	20.319	27.64	36	72	15/12/2021	36.609	84.35	657.2	681.5
Pt	15/05/2020	12.412	12.25	496	841	05/08/2018	41.619	25.04	2.277	2.085
Tr	12/04/2020	2.951	2.82	140	297	20/08/2018	19.368	11.76	1.987	1.204

Source: Own elaboration.

Finally, following the DISARM structure, we can identify the following patterns:

1. T0072.001: segmenting discourse by different geographic and language locations.
2. T0022: leveraging conspiracy theory narratives to appeal to the human desire to find a reason for events, invoking the participation of powerful actors, in this case NATO and the United States.
3. T0022.001: amplifying existing conspiracy theories, combining the current HAARP theory with other conspiracy theories such as chemtrails.
4. T0068: responding with a campaign during an active crisis when events are still being studied. These moments are particularly vulnerable for the population.
5. T0083: integrating the population's fears into the conspiracy narrative.
6. T0077: diverting attention away from the facts towards a specific target or enemy.
7. T0009.001: using academic or pseudo-scientific justifications through the words of a Romanian senator who promotes conspiracy theories.
8. T0099.001: astroturfing, employing a multitude of low-profile influencer accounts in a short period.

No other patterns were detected within the Disarm framework.

4. Conclusions

In response to the hypotheses presented, the following conclusions have been drawn:

Conspiracy theories significantly shape discourse on social networks around relevant events (Mahl *et al.*, 2022). The volume of tweets related to HAARP and earthquakes underscores their importance. The study reveals striking behavioral similarities across 11 languages —Turkish, English, Spanish, French, Japanese, Portuguese, Indonesian, German, Italian, Arabic, and Dutch. The network structure centers on English, acting as a hub with connections from all languages. This central role of English is evident in the consistent network patterns. Turkish stands out with a higher volume of messages. However, the networks in each language share similar structures, with statistical similarities even between diverse languages like Japanese and Portuguese or Arabic and Dutch. This aligns with previous studies (Erokhin and Komendantova, 2023; Mahl *et al.*, 2022), emphasizing the universality of these discourse structures.

Furthermore, an analysis of the chronological sequence of message dissemination in each language reveals statistically significant correlations in the number of messages sent simultaneously among Indonesian, Spanish, German, English, Dutch and French, and to a lesser extent, Arabic. There are also notable correlations between messages in

Portuguese and Italian and, to a lesser degree, with Japanese. Similar correlations have also been identified in previous studies of analogous phenomena (Mahl *et al.*, 2021).

H1. The discourse centers on a small number of organized accounts, a conclusion supported by study results. Character length, consistently at 140 characters across languages, suggests possible AI content generation (Fredheim, 2023). Accounts, aged 2-3 years, exhibit similar lifespans and a nano-influencer nature, aligning with disinformation studies (Arce-García *et al.*, 2023). Erokhin and Komendantova (2023) noted the crucial role of identifiable human accounts in such conversations, irrespective of bot involvement. Flags and symbols, like Russia's, unconventional language use (e.g., "Zs" supporting Ukraine invasion), and associations with the American alt-right, raise suspicions about account origins. This indicates a consistent global strategy, reinforcing the organized nature of the discourse and its potential ties to specific groups or agendas.

H2. Emotions also play a major role in the process and contribute to the increased spread of conspiracy theories. The presence of strong emotions, especially fear, anger and disgust, which are often associated with conspiracy theories, provoke reactions and polarisation in the recipients (Søe, 2018), which are later further diffused (Segado-Boj *et al.*, 2020, Zhao *et al.*, 2020).

In this regard, the examination of user profiles participating in the conversations reveals common expressions to self-identify in all languages: patriot, freedom, god, truth and world. Their messages contain shared words and connections to other conspiracy theories or statements by a Romanian senator known for her anti-vaccine and conspiracy stances. She was also named "Person of the Year in Romania in 2021" by the Russian news outlet Sputnik. The emotional use of the discourses in each analysed language shows coincidences in their average levels. This conclusion reinforces the findings of previous studies, such as Gkinopoulos and Mari (2023), who have already highlighted the importance of emotions in reinforcing the significance of conspiracy theories.

The Disarm methodology and frameworks from the European Union and NATO prove effective in analyzing such situations. Results confirm the suitability of several proposed frameworks in the methodology for the conducted analysis, offering a robust foundation open to further adjustments. The presence of several items described in DISARM gives an idea of possible hidden agendas behind these campaigns (Uscinski, 2018).

In summary, these findings indicate a consistent structure across languages, suggesting a campaign to disseminate conspiracy theories. HAARP holds a crucial role in these narratives, emphasizing the need to address bots' impact in curbing misinformation spread, highlighting the practicality of the Disarm methodology and allied frameworks in understanding and addressing such situations effectively.

Therefore, all aspects, such as the nature of the accounts, their relationships, behaviour, comments and the identification of typical patterns in disinformation campaigns, demonstrate a diffusion model that is not merely local but organised globally. Hence, even though each language or country may introduce some elements of local support or re-dissemination, larger-scale patterns of dissemination behaviour and messaging can be observed. Even in cases where there appear to be local models tied to religious or nationalistic aspects, their nature, scheduling, relationship and behaviour all point to a global strategy replicated and adapted to different locations exploited by one or more actors.

The limitations of this work are mainly due to the use of analysis lexicons designed in English and adapted to other languages, resulting in varying levels of accuracy. Moving forward, its important to continue to observe whether these diffusion patterns remain constant across conspiracy theories on a global scale. The datasets generated during the current study are available in the Figshare repository at: http://bit.ly/46jCgfH

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